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faces his account of his results with an interesting historical introduction, forming an admirable résumé of the topic. His own experiments consist in setting a movable weight upon a tuning fork, so that the resultant tone forms just a given interval with a constant fork; and, again, in finding the point at which the falsity of the interval is detected above and below. He then groups and averages the results, expressing the sensibility as the just perceptible portion of a vibration per second from the true interval. For Schischmánow, who is musical, and a fellow student K., who is not, the results for the different intervals thus expressed are: *Octave* (2:1), S 0.220, K 0.356; *Fifth* (3:2), S 0.332, K 0.374; *Fourth* (4:3), S 0.419, K 0.403; *Third* (5:4), S 0.485, K 0.559; *Major sixth* (5:3), S 0.502, K 0.506; *Second* (9:8), S 0.548, K 0.716; *Minor third* (6:5), S 0.607, K 0.640; *Minor sixth* (8:5), S 0.672, K 0.740; *Minor seventh* (9:5), S 0.678, K 0.763; *Major seventh* (15:8), S 0.861, K 0.902. While practice and individual differences play some part, the order as presented by Schischmánow, especially for the four best and the three worst appreciated intervals, may be taken as normal, and agrees very well with the order determined by Helmholtz, on the basis of the relative consonance of overtones, though Schischmánow does not regard this as the sole factor in the sensibility.

Die Seelenthätigkeit in ihrem Verhältniss zu Blutumlauf und Athmung.
Prof. Dr. ERNST LEUMANN. Philosophische Studien. Bd. V, H. 4.

This "lay" contribution is suggestive rather than positive, its object being to call attention to the desirability of noting pulse and respiration rates in connection with psychometric determinations. The failing of words to speak, as well as power to speak them, when out of breath, or physically weary, the slowing of pulse and respiration in drowsiness and sleep, illustrate the general relation in question. As suggesting the kind of relation experiment may establish, Prof. Leumann found in one subject a pulse of 77 when scanning at the rate of 113 feet per minute, and 83 when scanning 140 per minute. Of two gymnasium students, one with a pulse of 85 read 107 feet per minute normally, another with a pulse of 98 read 129 feet per minute. In a rather more accurate test the pulse rate was found to increase as the rate of reading increased. If pulse and respiration rate were noted, we might explain small variations now regarded as accidental. Again Prof. Leumann brings the pulse rate into relation with association times, with the indifference point in the time sense, and the respiration time into relation with the waves of attention, *i. e.*, the periods in the appearance and disappearance of a very faint sensation, but the relation is only a distant analogy. It would be interesting to know whether the waves of attention are larger in slow breathers than in rapid breathers, and so on.

Recherches sur les mouvements volontaires dans l'anesthésie hystérique. A. BINET. Rev. phil., Nov., 1889.

Binet continues his interesting studies in hysterical hemianæsthesia, this time reporting experiments on voluntary motion. By the use of the dynamometer and the dynamograph he has compared the voluntary movements on the sound and diseased sides in respect to intensity and duration, and by reaction-times as to rapidity. The following are the general results found in the case of the subjects on which he worked, for which, of course, he does not claim universality. Two types of activity can be traced, one generally found on the sound side, the other generally on the anæsthetic. The curves representing the first type differ from those representing the second in their greater height and their more rapid rise and descent. In that type also the reaction-time is shorter. Fatigue, however, appears more quickly, betraying itself by irregular respiration and tremors in the acting member. This last is in marked

contrast to the other type of action; the anæsthetic type can sometimes be maintained for long periods in fatiguing positions, (if the muscles are not put to a maximum exertion), without fatigue. Points of resemblance in the long continuance of moderate contraction are shown between this second type and suggested catalepsy and contractures. These types were not found in all subjects, nor must they be too closely connected with sensibility and anæsthesia. From the detailed observations of the article we cull the following. In hysterical hemianæsthesia the sound side is generally increased in power, in hysterical hemiplegia even more so. The dynamometric pressure is greater in each hand when acting by itself than in conjunction with the other, (a fact which Binet explains by the difficulty which hysterics experience in dividing their attention); the bilateral dynamographic curves are longer and flatter than the unilateral; and the reaction-times are much longer for both hands, especially on the anæsthetic side, when reaction is made with both hands than when each reacts by itself.

Recent experiments in crystal-vision. Proc. of Soc. for Psych. Research (Eng.). June, 1889.

The first half of this paper is devoted to an interesting historical account, from which it appears that "crystal-vision," under various names and making use of various reflecting surfaces, (bowls of water, gems, mirrors, pools of ink in the palm of the hand, sword blades, and even finger-nails), some times to communicate with the gods, some times with devils, openly or under ban, has been practiced for 3000 years in Europe, Asia, Africa, and the ends of the earth. The crystal-gazer looking into some one of these polished surfaces sees more or less elaborate visions. The lady who contributes the article has herself this uncommon faculty, and speaks from personal experience of upwards of 70 cases. If she has a grain too little skepticism as to telepathy, she nevertheless approaches the subject in an eminently matter-of-fact and open-minded fashion. Her experiences fall into 3 groups: "1. After-images or recrudescence memories, often rising thus and thus only from the sub-conscious strata to which they had sunk. 2. Objectivations of ideas or images (*a*) consciously or (*b*) unconsciously in the mind of the percipient. 3. Visions, possibly telepathic or clairvoyant, implying acquirement of knowledge by super-normal means." Under the first come casual impressions *e. g.* of objects seen on a walk, completely forgotten, later seen in the crystal, and with difficulty traced to the original circumstances. Under the second are classed (*a*) the images called up by the gazer, (*e. g.* groups of figures that, once voluntarily projected into the crystal, go on to actions quite unexpected by the gazer), or things that lie "on the mind," though not actually in consciousness; (*b*) odds and ends of images from the unconscious, to which the author refers as in general "so grotesque and commonplace" as "not to administer greatly to one's self-esteem." Of the third class not very many are reported, and none of these have reference to important events, unless it be one, which may be taken as a sample of all, where the crystal revealed a man with a muffled face looking into a small window from the outside, an image which was realized a few days later in the case of a fireman when the house was on fire and a muffled-face fireman looked into such a window. Some of these visions were so fully objective that their parts could be enlarged with a magnifying glass. The author confesses to more than ordinary powers of visualization without her crystal.

Versuche über den Einfluss des Schlafes auf den Stoffwechsel. H. LAEHR. Allg. Zeitsch. f. Psychiatrie. 1889. p. 286-317.

While the amount of nitrogen given off does not change, it is known that in sleep less carbonic acid is given off and less oxygen is taken up